Claims defining the Invention:

1. A method for removal of a freezable species from the natural gas feed stream, the method comprising the steps of:

cooling the feed stream in a cooling vessel to produce pressurised LNG in a manner such that the freezable species solidify forming a slurry with the pressurised LNG; and,

removing the slurry from the cooling vessel whilst maintaining the freezable species as a solid.

2. A method for removal of a freezable species as defined in claim 1 wherein the step of cooling is conducted so as to maintain a temperature gradient within the cooling vessel such that the temperature towards the centre of the cooling vessel is less than the temperature at the wall of the cooling vessel.

3. A method for removal of a freezable species as defined in claim 1 further comprising the step of separating the solids of the freezable species from the slurry.

4. A method for removal of a freezable species as defined in claim 3 wherein the step of removing the slurry from the cooling vessel is conducted simultaneously with the step of separating the freezable species from the slurry.

5. A method for removal of a freezable species as defined in any one of the preceding claims further comprising the step of recycling to the cooling vessel LNG from which the freezable species has been separated.

6. A method for removal of a freezable species as defined in any one of the preceding claims further comprising the step of liquefying the separated solid of the freezable species.

7. A method for removal of a freezable species as defined in claim 6 wherein further comprising the step of recycling to the cooling vessel natural gas from which the freezable species has been separated during the step of liquefying.

8. A method for removal of a freezable species as defined in claim any one of the preceding claims further comprising the step of creating a vortex within the cooling vessel.

9. A method for removal of a freezable species as defined in claim 8 wherein the vortex is created by stirring the slurry.

10. A method for removal of a freezable species as defined in any one of the preceding claims wherein the vortex is created alternatively or additionally by introducing a fluid stream tangentially to the cooling vessel.

11 A method for removal of a freezable species as defined in claim 10 wherein the fluid stream introduced tangentially to the cooling vessel is a stream of sub-cooled LNG.

12. A method for removal of a freezable species as defined in claim 11 wherein the stream of sub-cooled LNG may be the sub-cooled LNG stream recycled after separation of the freezable species from the slurry.

13. A method for removal of a freezable species as defined in any one of the preceding claims wherein the step of cooling comprises the step of isentropically expanding the feed stream.

14. A method for removal of a freezable species as defined in any one of the preceding claims wherein the step of cooling alternatively or additionally comprises the step of introducing a stream of sub-cooled LNG.

15. A method for removal of a freezable species as defined in claim 14 wherein the stream of sub-cooled LNG is the stream of recycled LNG separated from the slurry during the step of separating the solids of the freezable species.

16. A method for the continuous removal of a freezable species from a natural gas feed stream comprising the steps of:

cooling the feed stream in a cooling vessel to produce pressurised LNG in a manner such that the freezable species solidify forming a slurry with the pressurised LNG; and,

separating the solids of the freezable species from the slurry, wherein the step of cooling and the step of separating are conducted at the same working pressure.

17. A method for the continuous removal of a freezable species as defined in claim 16 wherein the steps of cooling and separating are conducted at the same pressure in use.

18. A method for the continuous removal of a freezable species as defined in claim 16 or 17 further comprising the step of heating the separated solids of the freezable species to form a liquid of the freezable species.

19. A method for the continuous removal of a freezable species as defined in claim 18 wherein the steps of cooling, separating and heating are conducted at the same pressure in use.

20. A method for continuous removal of a freezable species as defined in any one of claims 17 to 19 wherein the pressure is maintained at all times below the triple-point pressure of the freezable species.

21. A method for the continuous removal of a freezable species as defined in any one of claims 16 to 20 wherein the step of cooling is conducted so as to maintain a temperature gradient within the cooling vessel such that the temperature towards the centre of the cooling vessel is less than the temperature at the wall of the cooling vessel.

22. A method for continuous removal of a freezable species as defined in any one of claims 16 to 21 further comprising the step of separating the solids of the freezable species from the slurry.

23. A method for continuous removal of a freezable species as defined in claim 22 wherein the step of removing the slurry from the cooling vessel is conducted simultaneously with the step of separating the freezable species from the slurry.

24. A method for continuous removal of a freezable species as defined in any one of claims 16 to 23 further comprising the step of recycling to the cooling vessel LNG from which the freezable species has been separated.

25. A method for continuous removal of freezable species as defined in any one of the claims 16 to 24 further comprising the step of liquefying the separated solid of the freezable species.

26. A method for continuous removal of a freezable species as defined in claim 25 wherein further comprising the step of recycling to the cooling vessel natural gas from which the freezable species has been separated during the step of liquefying.

27. A method for continuous removal of a freezable species as defined in claim any one of the claims 16 to 26 further comprising the step of creating a vortex within the cooling vessel.

28. A method for continuous removal of a freezable species as defined in claim 27 wherein the vortex is created by stirring the slurry.

29. A method for continuous removal of a freezable species as defined in any one of the claims 18 to 28 wherein the vortex is created alternatively or additionally by introducing a fluid stream tangentially to the cooling vessel.

30. A method for continuous removal of a freezable species as defined in claim 29 wherein the fluid stream introduced tangentially to the cooling vessel is a stream of sub-cooled LNG.

31. A method for continuous removal of a freezable species as defined in claim 30 wherein the stream of sub-cooled LNG may be the sub-cooled LNG stream recycled after separation of the freezable species from the slurry.

32. A method for continuous removal of a freezable species as defined in any one of the claims 18 to 30 wherein the step of cooling comprises the step of isotropically expanding the feed stream.

33. A method for continuous removal of a freezable species as defined in any one of the claims 18 to 32 wherein the step of cooling alternatively or additionally comprises the step of introducing a stream of sub-cooled LNG.

34. A method for continuous removal of a freezable species as defined in claim 33 wherein the stream of sub-cooled LNG is the stream of recycled LNG separated from the slurry during the step of separating the solids of the freezable species.

35. An apparatus for removing a freezable species from a natural gas feed stream, the apparatus comprising:

a cooling vessel having a solidification zone therewithin wherein that part of the cooling vessel that surrounds the solidification zone is constructed from a material having a low thermal conductivity;

an inlet for introducing the feed stream to the cooling vessel; and,

an outlet for removing a slurry of solidified freezable species and pressurised LNG from the cooling vessel.

36. An apparatus for removing a freezable species as defined in claim 35 further comprising a solid/liquid separator for separating the solidified freezable species from the slurry.

37. An apparatus for removing a freezable species as defined in claim 36 wherein the separator is located at and/or defines the outlet.

38. An apparatus for removing a freezable species as defined in claim 36 or 37 wherein the separator may be one of a plurality of separators arranged in series or in parallel.

39. An apparatus for removing a freezable species as defined in any one of claims 35 to 38 further comprising an expansion valve located at and/or defining the inlet for introducing the feed stream to the cooling vessel.

40. An apparatus for removing a freezable species as defined in claim 39 wherein the expansion valve is a Joule-Thompson valve.

41. An apparatus for removing a freezable species as defined in any one of claims 35 to 40 further comprising a stirrer for creating a vortex within the cooling vessel in use.

42. An apparatus for removing a freezable species as defined in any one of claims 35 to 41 further comprising a tangential inlet.

43. An apparatus for removing a freezable species as defined in any one of claims 35 to 42 or claims 50 to 54 wherein the material of construction of an internal wall of the cooling vessel is polished.

44. An apparatus for removing a freezable species as defined in claim 43 or claims 50 to 54 wherein the internal wall is highly polished.

45. An apparatus for removing a freezable species as defined in any one of claims 35 to 44 or claims 50 to 54 wherein the material of construction of the internal wall is anisotropic.

46. An apparatus for removing a freezable species as defined in any one of claims 35 to 45 or claims 50 to 54 wherein the material of construction is a metal oxide.

47. An apparatus for removing a freezable species as defined in any one of claims 35 to 46 or claims 50 to 54 wherein the material of construction is a ceramic.

48. An apparatus for removing a freezable species as defined in any one of claims 35 to 47 or claims 50 to 54 wherein the material of construction is a single crystal.

49. An apparatus for removing a freezable species as defined in any one of claims 35 to 48 or claims 50 to 54 wherein the material of construction is sapphire.

50. An apparatus for continuously removing a freezable species from a natural gas feed stream, the apparatus comprising:

a cooling vessel having a solidification zone therewithin wherein that part of the cooling vessel that surrounds the solidification zone is constructed from a material having a low thermal conductivity;

an inlet for introducing the feed stream to the cooling vessel;

an outlet for removing a slurry of solidified freezable species and pressurised LNG from the cooling vessel; and

a solids collection vessel in fluid communication with the cooling vessel.

51. An apparatus for continuously removing a freezable species as defined in claim 50 further comprising a transfer means for transferring the slurry from the cooling vessel to the solids collection vessel.

52. An apparatus for continuously removing a freezable species as defined in claim 51 wherein the transfer means is inclined at an angle.

53. An apparatus for continuously removing a freezable species as defined in claim 52 wherein the angle is not less than 60° to the horizontal reference plane.

54. An apparatus for continuously removing a freezable species as defined in claim 52 or 53 wherein the transfer means is provided with an external drive.